CLOSTRIDIUM DIFFICILE INFECTION OUTBREAK IN A DISTRICT HOSPITAL, ROMANIA, DECEMBER 2013 - FEBRUARY, 2014

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Abstract: *In February 2013, we detected a diarrhoea outbreak due to Clostridium difficile (CD) in a Romanian district hospital. We aimed at describing cases characteristics, identify the potential source and associated factors to prevent future outbreaks. We identified cases using hospital and laboratory registries, we calculated incidence rates using as denominator the length of hospitalization and compared possible factors associated with infection between cases (GDH-positive) and other cases with diarrhoea in the study period (GDH-negative). The hospital did not have in place a specific guideline for antimicrobial usage. Laboratory tests were only available since 4th of January. The study identified as the possible source of the outbreak a case admitted on 9th December followed by infection spread probably due to not proper isolation of cases. This outbreak could have been limited by: better implementation of prevention practices, using proper policy in antibiotic consumption, and an active laboratory-based surveillance of CDI.*

Cuvinte cheie: *infecţie cu Clostridium difficile, focar, consum de antibiotic*

Rezumat: *În februarie 2013 am depistat un focar de diaree cauzată de Clostridium difficile într-un spital judeţean din România. Obiectivele noastre au fost descrierea cazurilor, identificarea sursei şi a factorilor asociaţi pentru prevenirea altor focare. Am identificat cazurile folosind registrele spitalului şi ale laboratorului, am calculat rata incidenţei folosind ca numitor durata de spitalizare şi am comparat factorii posibil asociaţi infecţiei între cazuri (GDH-pozitiv) şi alte cazuri cu diaree în aceeaşi perioadă (GDH-negativ). Spitalul nu folosea de un ghid specific de consum al antibioticelor. Testele de laborator au fost disponibile din 4 ianuarie. Rezultatele au indicat ca sursă posibilă un caz internat în decembrie, infecţia răspândindu-se apoi cel mai probabil datorită neizolării corecte a cazurilor. Acest focar ar fi putut fi limitat printr-o mai bună implementare a măsurilor de prevenire, folosirea unei politici corecte de consum al antibioticelor şi a unei supravegheri active de laborator a infecţiei cu CD.*

INTRODUCTION

On the 07th February 2014, a District Public Health Authority (PHA) announced that the District Hospital reported 17 cases of Clostridium difficile infection (CDI), with onset in January 2014.

Clostridium difficile infection (CDI) is the most frequent cause of hospital - acquired diarrhoea, which usually occurs in elderly hospitalized patients who recently had a course of antibiotics. Bacteria or its spores are usually spread on the hands of healthcare staff and other people who come into contact with the infected patients or with contaminated environmental surfaces (e.g. floors, bedpans, toilets).(1,2,3,4)

Our study objective was to assess the magnitude of the outbreak, describe cases characteristics, identify the potential source and factors associated with the infection, in order to better control the outbreak and prevent future similar outbreaks.

METHODS

During the study period, defined between 9th of December 2013 and 12th of February 2014, we actively looked for cases in order to determine the extent of the outbreak.

Cases were defined as any person admitted to the District Hospital, during the study period, presenting:

a) Diarrhoea after at least 48 hours from admission *or*
b) Diarrhoea at admission and with recent hospitalization history in the same hospital (less than 28 days).

Based on laboratory results, we classified cases as confirmed (GDH positive and one or both toxins positive – A and/ or B – using EIA) and probable (GDH positive and epidemiological criteria defined as admission on the same ward, in the same period, for patients with known associated infection factors).(3,5,6)

We described the confirmed and probable cases using charts, Hospital Acquired Infection Control Team's registry and laboratory registry. Laboratory tests were only available as of the 4th of January, cases identified before being tested in a private laboratory.

We calculated incidence rates using as denominator the length of hospital accommodation obtained from hospital statistics.

As factors associated with the infection, we included the time from admission to onset, defined as the time between hospital admission and diarrhoea onset and the time from antibiotic prescription to onset defined as the time between the start of antibiotic treatment and diarrhoea onset.

We compared the possible factors associated with infection between confirmed and probable cases and the other cases with diarrhoea in the study period that tested negative for CD, presenting univariable odds ratios (OR) with their 95% confidence interval (CI). Analysis was performed using Excel and STATA 12.

RESULTS

The hospital is a 5 floor building, with big rooms accommodating 6 to 8 patients and only 2 toilets per floor. Cases were isolated in specials rooms, together with other CDI patients from the same ward, but without the possibility of individual toilet as it is recommended in the literature.(5,7)

At hospital level, when the outbreak occurred, no guideline for antimicrobial usage was in place despite literature recommendations.(5,7)

We searched hospitals charts for patients with any kind of diarrhoea, finding a total of 51. Among them, we identified 31 confirmed and 6 probable cases. Of the remaining 14, 6 tested positive for CD but did not fulfil the case definition and were excluded and 8 tested negative and were included in the comparison group.

Cases were equally distributed among males and females with a median age of 70 years (range: 40 - 88). Epidemic curve's shape suggests a common persistent source of infection. The outbreak started in week 51, 2013 and it was ongoing when the study was performed (figure no. 1).

Figure no. 1. Distribution of CDI confirmed and probable cases (N = 37) by week of diarrhoea onset, in a district hospital, Romania, week 51, 2013 – week 7, 2014
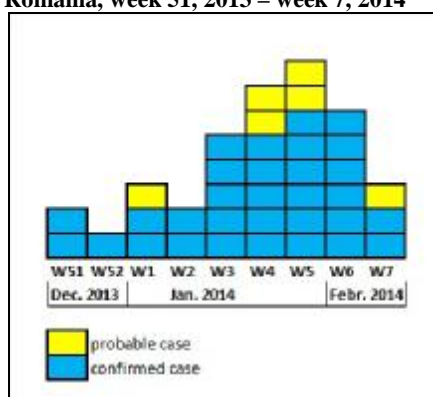
We identified as the possible source of the outbreak a 64-year-old man, admitted on 09th of December on Surgery I, presenting: peri-anal fistula, decrease weight and diarrhoea. He was confirmed with CDI on 12 December 2013, based on a private lab result. He had been discharged 2 months before from another hospital where he received treatment for his illnesses (chronic kidney failure, high blood pressure, cardiac failure (NYHA II)) and was excluded from the analysis not being according to the case definition.

The following case was a 88-year-old man, admitted on 10th December on Surgery I, with diarrhoea onset 7 days after admission, confirmed on 18th December 2013, based on a private lab result. First cases had onset on wards all located on the same floor (Surgery I, Plastic surgery and ICU), followed by cases spread on all hospital floors.

The incidence rate among cases admitted on invasive wards (defined as surgical wards and ICU) (1.71 per 1000 patient-hospitalization days, 95% [1.2-2.5]) was almost 4 times higher than the incidence rate among cases admitted on non -

invasive wards (defined as medical wards) (0.36 per 1000 patient-hospitalization days, 95% CI [0.2-0.9]).

Majority of cases had more than 7 day hospitalization (range: 5 - 59).The admission - onset interval had a median of 8 days (95%CI [7-12]) and the antibiotic – onset interval a median of 6.5 days (95%CI [5.14-8]). Mean of onset - diagnosis interval was equal to 3.8 days (range: 0 - 40). This interval decreased after raising the awareness of medical personnel and hospital laboratory started to test and confirm the CDI. All cases received antibiotics during hospitalization and 70.3% of cases received more than one antibiotic. Cases were immune-compromised patients (67.6%) or with multiple associated diseases. Almost half of them (56.8%) suffered a surgical intervention during the current hospitalization or in the recent past (less than 28 days) (table no. 1). When comparing the outbreak cases (GDH positive) with the other 8 cases with diarrhoea (GDH negative), we did not find any factor associated significantly (table no. 1), though CD cases were more likely to be admitted on an invasive ward, be immunocompromised, had a recent surgery or more than one antibiotic course.

Table no. 1. Comparison between CDI confirmed and probable cases with other cases of diarrhoea, in a district hospital, Romania, week 51, 2013 – week 7, 2014

Factors associated with infection		GDH positive cases		GDH negative cases		Univariable analysis		
		Total	Exposed (%)	Total	Exposed (%)	OR	95% CI	p value
Invasive ward*	Yes	31	86.50	5	62.50			
	No	5	13.50	3	37.50	5.8	0.44-27.69	0.10
Immunocompromised**	Yes	25	67.50	4	50.00			
	No	12	32.40	4	50.00	2.1	0.23-12.11	0.34
Number of antibiotics***	1	7	21.21	2	28.57			
	>1	26	78.79	5	71.43	1.5	0.12-11.74	0.67
Recent surgery (less than 28 days)	Yes	21	56.80	4	50.00			
	No	16	43.20	4	50.00	1.3	0.21-8.18	0.72
Antibiotic - onset interval (days)***	≤7	20	60.60	6	57.14			
	>7	13	39.40	3	42.86	0.8	0.12-8.52	0.86
Admission - onset interval (days)	≤7	17	46.00	3	37.50			
	>7	20	54.00	5	62.50	0.7	0.10-4.30	0.66
Age (years)	≤65	16	43.20	2	25.00			
	>65	21	56.80	6	75.00	0.4	0.04-2.54	0.34
Hospitalization (days)	≤7	4	10.80	0	0.00			
	>7	33	89.20	8	100.00	0.0	0-4.35	0.33

OR: odds ratio; CI: confidence intervals
* Invasive wards = surgical wards and ICU; non-invasive wards = medical wards
** Immune-compromised = persons diagnosed with one or more from the folloing cancer, chronic renal failure, chronic respiratory failure, chronic heart disease, complicated diabetes, stroke, severe burns (>30%)
*** 5 missing values, cases excluded because antibiotic treatment started after onset

DISCUSSIONS

We presented the results of the epidemiological study of an outbreak of diarrhoea due to Clostridium difficile in a district hospital in Romania. The outbreak was detected on January 2014, but cases were ongoing since early December 2013. The description of cases distribution by wards and by date of onset pointed to the first case identified in December as the possible source of infection.

Though the small number of cases did not allow us to find factors statistically significant that could have contributed to the spread of the outbreak, we could identify some pitfalls when the outbreak occurred.

The laboratory testing for CD was not available in the hospital in December and only cases that had a private laboratory test could be identified. This may be translated in a number of cases not diagnosed that could have contributed to the spread of the outbreak.

Together with the unavailability of laboratory tests we found that the hospital prescribed antibiotics for both prophylaxis and treatment, without having in place a specific guideline for antimicrobial usage. Finally, we observed that cases were not properly isolated and there were not enough facilities for personal hygiene.

CONCLUSIONS

The current outbreak could have been limited by a better implementation of prevention practices in the hospital, by using a proper policy in antibiotic consumption and by an active laboratory-based surveillance of CDI.

REFERENCES

1. Carrico RM, Archibald LK, Bryant K, Dubberke E, Litz Fauerbach L, Garcia JG et al. Guide to the Elimination of Clostridium difficile in Healthcare Settings.
2. Public Health England Topics – Clostridium difficile Available at http://www.hpa.org.uk/topics/infectiousdiseases/infectionsaz/clostridiumdifficile/.
3. Popescu GA. Guidelines for Diagnosis, Treatment and Prevention of Clostridium difficile infection. Available at http://www.ms.ro/?pag=181.
4. Popescu GA, Serban R. Guidelines for patient and family regarding Clostridium difficile infection.
5. Cohen SH, Gerding DN, Johnson S, Kelly CP, Loo VG, Clifford McDonald L, Pepin J, Wilcox MH. Clinical Practice Guidelines for Clostridium difficile Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) Infection Control and Hospital Epidemiology. 2010;31(5).
6. Murphy J. Clostridium difficile: An overview International Journal of Infection Control.
7. Vonberg RP, Kuijper EJ, Wilcox MH, Barbut F, Tüll P, Gastmeier P. European C difficile-Infection Control Group; European Centre for Disease Prevention and Control (ECDC), van den Broek PJ, Colville A, Coignard B, Daha T, Debast S, Duerden BI, van den Hof S, van der Kooi T, Maarleveld HJ, Nagy E, Notermans DW, O'Driscoll J, Patel B, Stone S, Wiuff C. Infection control measures to limit the spread of Clostridium difficile. Clin Microbiol Infect 2008;14(Suppl. 5):2-20.